



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Teresa Grocela Rocha et al.

Serial No.: 10/743,646

Filed: December 22, 2003

For: CATALYST SYSTEM AND
METHOD FOR THE REDUCTION
OF NOx

§ Group Art Unit: 1754
§ Examiner: Strickland, Jonas N
§ Atty. Docket: 129438-1/YOD
GERD:0608
§

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Lynda Howell

PRE-APPEAL BRIEF REQUEST FOR REVIEW

In accordance with the OG Notice of July 12, 2005, Appellants respectfully submit this Pre-Appeal Brief Request for Review. This Request is being filed concurrently with a Notice of Appeal.

In the Final Office Action mailed on October 21, 2005, the Examiner essentially reiterated or copied the rejection formulated in the previous non-Final Office Action. Because the Appellants believe that the rejections are improper, the present Appeal has been filed.

The Examiner rejected all of pending claims 1-15, 24 and 25 under 35 U.S.C. §103(a). Of these, claims 1 and 15 are independent.

Rejections Under 35 U.S.C. § 103(a)

Claims 1-12 and 15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Okimura et al. (U.S. Patent No. 5,955,046, hereinafter “Okimura”) in view of Park (U.S. Patent No. 6,706,660, hereinafter “Park”) and Kepner et al. (U.S. Patent No. 6,342,191, hereinafter “Kepner”).

Okimura discloses a catalytic system comprising a complex oxide as the main phase. The complex oxide has a spinel structure and contains Al, Ga and Zn. As known in literature, metal oxides with spinel structures comprise plurality of metals with a very specific ratio of metal to oxygen. Okimura merely uses Ga oxides as an ingredient for the final product of complex oxides which form the main phase of the catalyst. Therefore, the complex oxide of the resulting spinel structure does not include Ga oxide. Ga oxide is merely a source for one of the multiple metals (Ga) present in the final complex oxide.

In the Final Office Action and in the Advisory Action mailed on January 18, 2006, the Examiner argued that the lack of a spinel structure, or any particular structure is not recited in the pending claims. Appellants submit that the Examiner has completely missed the point of the Appellants’ argument. The purpose of discussing the spinel structure of Okimura was not to point out that the claims in the present application do not have spinel structure, but to understand the fundamental difference between a spinel structure as described by Okimura as the main phase in the catalyst and the presence in the catalyst of gallium oxide as recited in the present claims.

As known in literature, spinel structures have a cubic close packed structure with a generic formula of XY_2O_4 , where X is a cation with a +2 charge and Y is a cation with a +3 charge. Due to this special atomic structure, their behavior and properties are different than simple oxides such as gallium oxide. Appellants recognize that the starting material of the catalyst system described by Okimura has gallium oxide, but the end

product of the complex oxide with a spinel structure does not include gallium oxide in the catalyst system, but specifically includes only spinel structures. That is, although gallium is present in the complex oxides described by Okimura, it is not present in the catalyst as gallium oxide but as part of the complex oxide which forms the main phase of the catalyst.

In the ternary phase diagram (shown in FIG. 1 of Okimura), the hatched portion clearly shows the operating ranges of the complex oxides described by Okimura. Any composition within the hatched region will include all three metals namely zinc, aluminum and gallium to arrive at the complex oxide of the spinel structure. Okimura discloses that:

[w]hen the amount of ZnO becomes 50 mol% or larger, crystals having other than spinel structure will be formed, resulting in potential deterioration in catalytic activity... Col. 3, lines 7-10.

Okimura clearly teaches that the properties of the spinel structures of the complex oxides are different by keeping the compositions of Zn, Al and Ga under some specific ranges. Therefore the catalytic system described by Okimura is fundamentally different from the catalyst system claimed, and would not and could not function in a similar manner.

The Examiner noted that the claims do not specifically recite that the claimed metal oxides do not have a spinel structure. Appellants contend that the claims need not include such a recitation to clearly distinguish the invention over the cited art. Indeed, independent claims 1 and 15 recite gallium oxide, indium oxide or a combination of the two. As noted above, Okimura, which forms the basis for the rejection as regards the inclusion of the recited oxides, does not teach the use of such oxides, but rather a complex that no longer can be said to include the basic oxides at all. Claims 1 and 15

therefore need not explicitly exclude complex oxides having spinel structures, as the claims affirmatively include gallium oxide.

Kepner describes a catalyst and binder system with a binder and a pendant ligand substituted or unsubstituted adsorbent. The system described by Kepner is fundamentally different from the catalyst system of the present invention. The catalyst system of the present invention does not include either a binder or an adsorbent. Even more fundamentally, Kepner does not teach the use of the oxides recited in the pending independent claims, and the Examiner did not advance that it does.

Park describes a catalyst system including an oxide support material, and a metal promoter or dopant. However, Park neither discloses nor suggests use of a hydrocarbon as a reductant comprising at least 4 carbon atoms. The use of hydrocarbon comprising higher carbon content is not suggested by any of the cited references. Here again, Park fails to teach the oxides missing from Okimura and Kepner.

Given the fact that none of the references teaches at least the use of the recited oxides, the combination of Okimura, Kepner and Park cannot suggest or teach the catalyst system of the present claims. Thus, the references cannot support a *prima facie* case of obviousness.

Claims 13, 14 and 24-25 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Okimura in view of Park and Kepner as applied to claims 1-12 and 15, and further in view of Balmer-Millar (U.S. Patent Application No. 2003/0118960, hereinafter “Balmer-Miller”).

Balmer-Miller describes a NO_x after-treatment system. As described by Balmer-Miller, the reductant used for NO_x reduction are oxygenated hydrocarbons derived from the fuel source. The example of the fuel source is given as gasoline. Gasoline itself is

not used as the reductant, but is merely used to derive the oxygenated reductant, which is finally used in the catalyst system to reduce NO_x. Balmer-Miller neither suggests nor discloses use of hydrocarbon comprising at least 4 carbon atoms. As well-known in art, and also defined in paragraph 18 of the present application, hydrocarbons contain only carbon and hydrogen atoms. As also known in the art, the reactions of oxygenated hydrocarbons and non-oxygenated hydrocarbons are fundamentally different. The use of gasoline, hydrocarbon containing 8 carbon and other higher hydrocarbons as recited in claims 13-14 and 24-25 are neither suggested nor disclosed by Balmer-Miller.

For all of the above reasons, Appellants respectfully request that the Panel instruct the Examiner to withdraw the outstanding rejections and allow the pending claims.

Respectfully submitted,

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